UNIVERSITI PUTRA MALAYSIA

EFFECT ECOLOGICAL RANGELAND MANAGEMENT ON LIVESTOCK PRODUCTION OF SETTLED NOMADS IN THE BAKKAN REGION OF SOUTHERAN IRAN

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DOCTOR OF PHILOSOPHY
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By

GHOLAM REZA BADJIAN

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfillment of the Requirement for the Degree of Doctor of Philosophy

August 2005

To my family

I would like to dedicate this body of work to the nomads of Bakkan for whom we envision a better life and look for inspiration. I hope that in my own little way I have been able to make a difference in their lives.

Abstract of the thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the Degree of Doctor of Philosophy

EFFECT OF ECOLOGICAL RANGELAND MANAGEMENT ON LIVESTOCK PRODUCTION OF SETTLED NOMADS IN THE BAKKAN REGION OF SOUTHERN IRAN

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August 2005

Chairman: Professor Dahlan Ismail, PhD

Faculty: Agriculture

The Nomad Production System (NPS) in Bakkan covers four new villages (RSNs), two old villages (PSNs) and other nomads who migrate yearly (NSN). The NPS has two major sub-systems, namely, the Cropland Production System (CPS) and the highland Range Production System (hRPS). These systems are linked together by grazing energy intake models of the sheep and goats under the NPS. This study focused on the identification and analysis of the components of the NPS during one complete year in the Bakkan distinct, located in Southern Iran. Therefore, the objectives of the study are: (1) To identify and describe the current components of a hRPS and their interactions; (2) To analyze CPS and its components as an alternative option to increase the yield and efficiency of rangeland production, considering the impact of water availability; (3) To identify the components of a grazing ruminant production system and their interactions; (4) To estimate and analyze changes in the distribution of cropland/rangeland income by farm size, and changes in rangeland allocation as a result of nomadic settlement; and finally (5) To evaluate the implications of the nomads' decisions on resource use.

Based on the study objectives, an approach system was determined to be the best way of recognizing the effects of, and the relationships between the components. Since nomads are the main part of this dynamic system, modeling and simulating them is the most effective way to study and assess this complex system.

Economic evaluation was another part of the study that was done based on a cost/benefit analysis method. Surveys were used as a technique to gather data, from interviews with nomads and the heads of their groups over a period of six months. The GIS tool helped to prepare different layers of features and attributes of the Proper Use Factors (PUF) model to show the integrated components of the PUF model in the Available Forage (AF) of highland Range Production System.

In conclusion, it was found that NSN, during wet and drought years, have a proportion of 9-10% of the whole production capacity in Bakkan. NSN have good pasture lands with proper condition and trend, and with suitable soil and slope properties. RSNs have a proportion of 53-57% of the whole production capacity in Bakkan during wet and drought years. PSN1 and PSN2, with about 26 years and 100 years of settlement in Bakkan, respectively, have more farming and animal husbandry experience in comparison to the RSNs. Therefore, they would be expected to have higher crop production rates, to use better range management techniques, and to observe proper carrying capacity (CC) limits in comparison with the others. These observations validate the generalized structure of the energy utilization models of grazing sheep under the different feeding and production systems, and these models can be coupled with the appropriate models of feeds and feeding systems in

rangeland, cropland, and hand feeding systems. These results will enable the prediction of CC in any given situation under conditions similar to those in Bakkan.

Finally, the sensitivity analysis used to derive the benefit/cost (B/C) ratio of the project "with settlement", and with a longer sustainable life cycle, showed much less economic efficiency than the project "without settlement" due to the consideration of ecological effects in the former case. In the latest settlement project, it was seen that discounting effects are not noticeable unless environmental benefits significantly outweigh the influence of the cost savings benefit of the "without settlement" project.

Keywords: Bakkan region, Ecological rangeland management, Livestock production, Settled nomads, Southern Iran.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN PENGURUSAN EKOLOGI RANGELAND KE ATAS PRODUKSI TERNAKAN NOMAD BERTEMPAT DI KAWASAN BAKKAN SELATAN IRAN

Oleh

GHOLAM REZA BADJIAN

Ogos 2005

Pengerusi : **Professor Dahlan Ismail, PhD**

Fakulti : **Pertanian**

Sistem produksi nomad (NPS) di Bakkan meliputi empat perkampongan baru, RSNs, dua perkampongan lama PSNs, dan sebahagian nomad yang berpindah setiap tahun (NSN). NPS mempunyai dua sub-sistem major, saperti Sistem Produksi Kawasan Tanaman (CPS) dan Sistem Produksi Banjaran Tanah Tinggi (hRPS). Sistem-sistem ini di bentuk dengan gabungan model-model produksi foraj/herbage, dan model-model keperluan tenaga bebiri/kambing di dalam NPS. Kajian ini memberi fokas kepada pengenalan dan analisa komponen-komponen dari NPS semasa satu tahun lengkap di Daerah Bakkan, yang terletak di selatan Iran. Dengan itu, objektif kajian adalah : (1) Untuk mengenal dan membincang komponen semasa sistem produksi rangeland dan interaksi mereka ; (2) Untuk analisa produksi kawasan tanaman dan komponen-komponen nya sebagai pilihan alternatif untuk menambah hasil dan kecekapan produksi rangeland, mengambilkira impak kesediaadaan air ; (3) Untuk mengenal komponen-komponen sistem produksi ragutan ruminan dan interaksi antara mereka ; (4) Untuk menganggar dan analisa perubahan dalam taburan pendapatan kawasan tanaman/rangeland dengan saiz ladang, dan perubahan dalam

penempatan nomad ; dan (5) Untuk menilai implikasi keputusan nomad keatas kegunaan sumber.

Berasaskan objektif kajian, pendekatan sistem telah dikenalpasti sebagai kaedah terbaik mengenali kesan-kesan, dan pertalian antara komponen-komponen. Oleh kerana nomad adalah bahagian utama dalam sistem dinamik ini, kaedah modeling dan simulasi adalah yang paling berkesan untuk kajian dan penilaian sistem kompleks ini.

Penilaian ekonomi adalah bahagian seterusnya dalam kajian ini yang dijalankan berdasarkan kaedah analisa kos/faedah (cost/benefit analysis method). Bancian telah dijalankan sebagai teknik pengumpulan data, melalui temuduga nomad dan ketua-ketua kompulan mereka selama enam bulan. Peralatan GIS menolong penyediaan lapisan-lapisan yang berbeza dari sifat-sifat dan pertalian model faktor guna patut (Profer Use Factors – PUF) untuk menunjukkan integrasi komponen-komponen model PUF dalam foraj tersedia (Available Forage – AF) di hRPS.

Kesimpulan, diketahui bahawa NSN, semasa tahun-tahun lembab dan kering, keupayaan produksi hanya 9-10% dari keseluruhan bahagian di Bakkan. NSN mempunyai kawasan pastura dengan keadaan yang sesuai dan berarah-tuju, dan dengan kesesuaian sifat-sifat tanah dan cerun. PSNs mempunyai keupayaan produksi 53-57% dari keseluruhan bahagian di Bakkan semasa tahun-tahun lembab dan kering. PSN1 dan PSN2, dengan 26 tahun dan 100 tahun penempatan di Bakkan, berturutan, mempunyai pengalaman yang lebih dalam pengurusan perladangan dan ternakan jika di bandingkan dengan RSNs. Dengan sebab itu, boleh

dijangkakan mereka mempunyai kadar produksi tanaman yang lebih tinggi, boleh mengunakan teknik pengurusan ladang yang lebih baik dan boleh mengawasi had-had keupayaan muatan (CC) yang lebih baik jika di bandingkan dengan lain-lain kawasan. Pengamatan ini mengesahkan struktur umum model pengunaan tenaga bebiri meragut di bawah pemakanan dan sistem produksi yang berbeza boleh dipakai, dan model-model ini boleh di hubungkan dengan model makanan dan sistem pemakanan yang sesuai dalam sistem rangeland, kawasan tanaman dan pemberian makanan dengan tangan. Keputusan kajian ini membolehkan ramalan keupayaan muatan di buat dalam sebarang situasi yang sama dengan Bakkan.

Akhirnya, analisa sensitiviti yang digunakan untuk menghasilkan nisbah faedah/kos (B/C ratio) projek "dengan penempatan" dan dengan putaran hidup lestari yang lebih lama, telah menunjukkan ia nya kurang keupayaan ekonomi dari projek "tanpa penempatan", disebabkan penekanan kepada kesan ekologi dalam kes terawal. Dalam projek penempatan terkini, telah didapati kesan 'discounting' tidak kelihatan melainkan kebaikan kepada alam sekitar yang nyata melebihi pengaruh kebaikkan kos simpanan projek "tanpa penempatan".

Kekunci perkataan : Kawasan Bakkan, Pengurusan ekologi rangeland, Produksi ternakan, Penempatan Nomad, Selatan Iran.

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I certify that an Examination Committee met on 19th August 2005 to conduct the final examination of Gholam Reza Badjian on his Doctor of Philosophy thesis entitled "Effects of Ecological Rangeland Management on Livestock Production of Settled Nomads in the Bakkan Region of Southern Iran" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee are as follows:

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Date: 08 SEP 2005

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

Badjian

GHOLAM REZA BADJIAN

Date 18 AUGUST 2005

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